

REMARKS

Favorable reconsideration of this application in light of the preceding amendments and the following remarks is respectfully requested.

No claims having been canceled and claim 41 added, the Applicants respectfully submit that claims 1-41 remain properly under consideration in this application. The Applicants contend that support for claim 41 may be found in at least original claims 1 and 2.

The Applicants note with appreciation the Examiner's indication that the drawings have been accepted by the Examiner. Action Summary at 10.

Specification

Although the Applicants appreciate the Examiner's suggestion with regard to the statement regarding the incorporation by reference of the priority documents, Action at 2, the Applicants respectfully prefer to retain an explicit incorporation of these references in the Specification text. As indicated above, however, the Applicants have slightly amended the corresponding section of the specification to clarify the relationship between these applications and reduce the likelihood of confusion in this regard.

Rejections under 35 U.S.C. § 103

Claims 1, 23, 24, 26-29 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Ballantine et al.'s U.S. Patent No. 6,339,018 ("Ballantine") in view of Wolf et al.'s treatise *Silicon Processing for the VLSI Era*, Vol. 1 ("Wolf"). Action at 3. The Applicants traverse this rejection for the reasons detailed below.

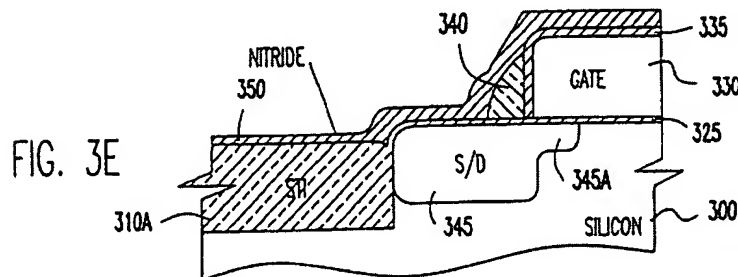
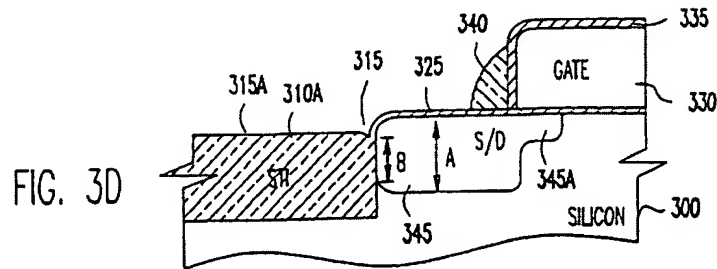
The Applicants again note that the rejected claims require that the recited steps be performed "in order." For example, claim 1 recites:

1. A method of forming a semiconductor device comprising, *in order*:
 - implanting a dopant into a substrate to form a source/drain region;
 - forming a silicide blocking layer* on the substrate;
 - annealing the substrate* to activate a portion of the dopant, the annealing being conducted at an anneal temperature T_a ;
 - exposing silicon surfaces on the substrate;
 - forming silicide layers on the exposed silicon surfaces, the silicide layers being formed at a silicidation temperature T_s , wherein $T_s < T_a$.

Application, claim 1 (emphasis added).

The Applicants further note that, it appears from Ballantine's disclosure, particularly as illustrated in FIGS. 3D and 3E (reproduced below), that the implanted S/D dopant regions 345 are annealed *before* formation of the silicide blocking layer 350 as clearly evidenced by the portions of the S/D and LDD regions extending under the sidewall structure 340 and gate electrode 340 respectively. Accordingly, Ballantine does

not teach or suggest to one of ordinary skill in the art the specific sequence of steps recited in claim 1, but instead discloses a conventional process as outlined in Applicants' FIG. 1.



Alternatively, the Applicants suggest that the process flow indicated in Ballantine's FIG. 2 could arguably be interpreted (even though such an interpretation would be inconsistent with Ballantine's patent drawings) as deferring any activation of the implanted dopant species until after the formation of the silicide (Ballantine's Step 250). However, in the event that such a process flow was utilized, the sequence of process steps would still not correspond precisely to the order of those steps recited in claim 1. Accordingly, the Applicants contend that none of the processes taught or arguably suggested by Ballantine can fairly be said to teach or suggest to one of ordinary skill in the art the specific sequence of steps recited in claim 1 or any claim that depends directly or indirectly from claim 1.

The Applicants further contend that Wolf's generic annealing process does not remedy the noted deficiencies of Ballantine with respect to the specific sequence of the process steps.

The Applicants, therefore, contend that the proposed combination of references is not sufficient to render the rejected claims unpatentable and request that this rejection be reconsidered and removed accordingly.

Claims 30 and 31 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Ballantine in view of Wolf and further in view of Ku et al.'s U.S. Patent No. 6,329,276 ("Ku"). Action at 6. The Applicants traverse this rejection for the reasons detailed below.

The Applicants incorporate by reference the discussion above regarding the deficiencies of the proposed combination of Ballantine and Wolf for teaching the method as recited in claim 23 from which claims 30 and 31. With respect to Ku, the Applicants agree that the use of capping layers in conjunction with silicidation processes was known, but contend that Ku does not remedy the noted deficiencies of the primary references with respect to the underlying claim elements. Accordingly, the Applicants maintain that the proposed combination of references is not sufficient to render the invention obvious to one skilled in the art.

The Applicants, therefore, contend that the proposed combination is insufficient to maintain the present rejection under 35 U.S.C. § 103(a) and request that it be reconsidered and withdrawn accordingly.

Claims 32-35 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Ballantine in view of Wolf, and further in view of Cabral, Jr. et al.'s U.S. Publication No. 2004/0123922 ("Cabral"). The Applicants traverse this rejection for the reasons detailed below.

The Applicants incorporate by reference the discussion above regarding the deficiencies of the proposed combination of Ballantine and Wolf for teaching the steps, in order, of the method as recited in claim 23 from which claims 32-35 depend. With respect to Cabral, the Applicants note that the various alloying metals are added to the nickel to obtain certain changes in the properties of the primary metal. The Applicants further note that Cabral indicates that "the temperature at which agglomeration occurs is about 550 °C.," Cabral, page 2, paragraph [0030], and, consequently, that when the silicidation process is performed below this temperature, *e.g.*, as recited in claims 34 and 35, the stated "motivation" for using an alloying metal to suppress agglomeration disappears. The Applicants contend that one skilled in the art would not, therefore, have been motivated to prepare the recited alloy composition to suppress a behavior in the siliciding layer that would not reasonably be expected to occur.

With respect to Cabral, the Applicants agree that the use of various alloying metals in conjunction with silicidation processes was known, but contend that Cabral does not remedy the noted deficiencies of the primary references with respect to the underlying claim elements. Accordingly, the Applicants maintain that, in addition to the deficiencies noted above, the proposed combination of references is not sufficient to render the invention obvious to one skilled in the art.

The Applicants, therefore, contend that the proposed combination is insufficient to maintain the present rejection under 35 U.S.C. § 103(a) and request that it be reconsidered and withdrawn accordingly.

Allowable Subject Matter

The Applicants note with appreciation the Examiner's indication that claims 12-22 are allowed and that claims 2-11, 25 and 36-40 are objected to as depending from a rejected base claim and would, therefore, be allowable if rewritten in independent form incorporating limitations of all included claims. For the reasons detailed above, however, the Applicants respectfully contend that claims 1 and 23, from which each of the claims objected to are also allowable over the applied references and, consequently, the dependent claims need not be rewritten.

Further the Applicants note that new claim 41 corresponds to claim 2 as rewritten in independent form and does not, therefore, present any new issue for consideration and should, consistent with the noted indication of allowable material, be allowed.

CONCLUSION

In view of the above remarks and amendments, the Applicants respectfully submit that each of the pending objections and rejections have been addressed and overcome, leaving the present application in condition for allowance. A notice to that effect is respectfully requested.

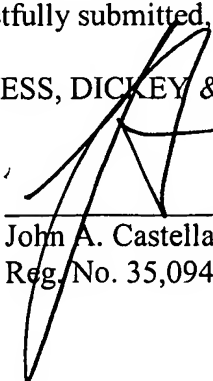
If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge any underpayment or non-payment of any fees required under 37 C.F.R. §§ 1.16 or 1.17, or credit any overpayment of such fees, to Deposit Account No. 08-0750, including, in particular, extension of time fees.

Respectfully submitted,

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By:



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